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INTERNATIONAL PRELIMINARY EXAMINATION REPORT



(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P60165PCT	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/EP 02/09997	International filing date (day/month/year) 06.09.2002	Priority date (day/month/year) 17.07.2002
International Patent Classification (IPC) or both national classification and IPC C23C18/42		
Applicant ATOTECH DEUTSCHLAND GMBH et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.  
  
☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).  
  
These annexes consist of a total of 1 sheets.

3. This report contains indications relating to the following items:  
  

I	<input checked="" type="checkbox"/>	Basis of the opinion
II	<input type="checkbox"/>	Priority
III	<input type="checkbox"/>	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
IV	<input type="checkbox"/>	Lack of unity of invention
V	<input checked="" type="checkbox"/>	Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
VI	<input type="checkbox"/>	Certain documents cited
VII	<input type="checkbox"/>	Certain defects in the international application
VIII	<input type="checkbox"/>	Certain observations on the international application

Date of submission of the demand  30.12.2003	Date of completion of this report  10.11.2004
Name and mailing address of the international preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer  Ramos Flores, C  Telephone No. +49 89 2399-8310  

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. **PCT/EP 02/09997**

**I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, Pages**

1-28 as originally filed

**Claims, Numbers**

8-19 as originally filed

1-7 filed with telefax on 14.06.2004

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

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**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes: Claims	4-15,17,18
	No: Claims	1-3,16,19
Inventive step (IS)	Yes: Claims	1-19
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-19
	No: Claims	

**2. Citations and explanations**

**see separate sheet**

**INTERNATIONAL PRELIMINARY  
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International application No. PCT/EP 02/09997

**Re Item I**

The applicant has introduced the term "a bondable and/or solderable layer of" into claim 1. Basis for this amendment can be found on pages 8 and 10-11 of the application as originally filed.

**Re Item V**

**Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Reference is made to the following documents:

- D1: GB 967 681 A (MOND NICKEL CO LTD) 26 August 1964 (1964-08-26)
- D2: US-A-6 034 422 (HATSUTA CHIAKI ET AL) 7 March 2000 (2000-03-07)
- D3: WO 02 29132 A (SPARING CHRISTIAN ; HUTCHINSON CARL (DE); MAHLKOW HARTMUT (DE); ATO) 11 April 2002 (2002-04-11) cited in the application
- D4: EP-A-0 797 380 (MACDERMID INC) 24 September 1997 (1997-09-24) cited in the application
- D5: DATABASE WPI Section Ch, Week 198603 Derwent Publications Ltd., London, GB; Class A85, AN 1986-017757 XP002225878 & JP 60 241291 A (TOSHIBA KK), 30 November 1985 (1985-11-30)

2. Novelty

The new term, however, does not introduce a distinguishing feature in view of D1 (compared to the subject-matter originally claimed). Consequently, the subject-matter of claims 1-3, 16 and 19 is anticipated by D1:

Document D1 discloses (page 3, lines 1-15, 77-82) a method of plating on a substrate by a displacement plating reaction provided with a copper surface comprising (a) depositing a first metal, such as platinum or palladium from an acidic solution on the substrate in a first step and (b) plating silver on said substrate in a second method step.

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International application No. PCT/EP 02/09997

Documents D2, D3 and D4 relate to a one step method of plating silver on a substrate. Document D5 discloses complexing agents suitable for chemical copper plating baths. Hence, none of these documents anticipate the subject-matter claimed.

**3. Inventive step**

The document D4 is regarded as being the closest prior art to the subject-matter of claim 1 (as regards the embodiment with silver used in both method steps). D4 mentions a two step method wherein in a first step a first metal is deposited which is more noble than copper and in the second step another metal is chosen which is more noble than the first metal (page 4, lines 1-11). However, silver is only used and specified as a metal suitable for the first step, e.g. gold is recommended as a metal for the second method step.

The subject-matter claimed differs from D4 at least in that according to the application the metal used in the second step does not have to be more noble than the first metal but can be even the same as in the case of silver (provided different rate).

The applicant has shown (see example 3 and comparative example) that the solderability of the layer is improved when the deposition rate in the two steps is different.

Consequently, the objective technical problem can be regarded as to provide a method which results in an improved solderability.

Neither D4 alone nor in combination with another document cited give an incentive to apply different deposition rates for silver in order to solve this problem. Thus, the embodiment relating to the plating of silver in two steps, whereby silver is used in both steps is not obvious in view of the documents cited.

**4. The subject-matter claimed is industrially applicable.**

# Claims

1. A method of plating silver on a substrate by a displacement plating reaction  
5 provided with a copper surface comprising

a) depositing a first metal which is more noble than copper on the  
substrate in a first method step and

b) plating silver on said substrate in a second method step, with the  
proviso that the first metal is deposited at a rate that is at most half the  
10 rate of plating of silver in the second method step when the first metal is  
silver.

2. The method according to claim 1, **wherein** the first metal is palladium or  
gold.

3. The method according to claim 2, **wherein** palladium is plated from an acidic  
solution.

4. The method according to one of the claims 2 and 3, **wherein** palladium is  
20 plated from a solution containing sulfuric acid.

5. The method according to claim 1, **wherein** the first metal is silver and the  
rate of silver deposition from a silver deposition bath in the first method step is  
regulated by adjusting at least one deposition parameter and/or by adjusting  
25 the composition of the silver bath.

6. The method according to claim 5, **wherein** the rate of silver deposition in the  
first method step is regulated by adjusting the processing temperature.

7. The method according to one of the claims 5 and 6, **wherein** the rate of  
30 deposition of the silver in the first method step is regulated by using a Cu(I)  
complexing agent in the silver bath.